Chapter 8
BECS

8-1. System Description

a. BECS is a common computer-based software package. The communications planner uses BECS to design, develop, and produce the SINCGARS variables and SOI material. The BECS terminal can be used to manipulate unit SOI data bases to produce outputs in electronic and hard copy formats. The fielding of data storage devices makes hard copy SOI obsolete and eases the operator's burden of carrying and using the paper SOI.

b. BECS is being fielded from corps through brigade and separate maneuver battalion levels. Corps and division signal planning sections use BECS to generate the SOI and FH variables for their own levels and subordinates. The brigade and battalion units use BECS to reproduce SOI documents and ECCM fill for use at their respective levels.

8-2. Components and Capabilities

a. The current BECS terminal is designed around three primary components:

- BGU.
- Printer.
- Fill devices.

With the complete fielding of the EN, the terminals at brigade and battalion levels will be used primarily as storage and transfer devices for the FH variables. Until that time, BSOs will use them to produce paper copy SOIs.

(1) BGU. The AN/GYK-33 BGU is a small microcomputer with a self-contained screen and disk drive. The NSA developed the operating system software that produces the SOI and FH variables. The system may eventually be transferred to the Army Command and Control Computer System (ACCCS) for use in field situations.

(2) Printer. The dot matrix printer can produce a paper copy of the SOI. It does not produce any of the variables for radio operation. The variables must be transferred to one of the fill devices available for the CNR system in use.

(3) Fill devices. The two fill devices associated with CNR systems are the MX-10579 and the EN. The MX-10579 holds the hopset, the net identifier, and the TSK variables. The current EN holds the same variables along with a complete or partial SOI and a common time reference. The follow-on data transfer device (DTD) being developed by the NSA will also hold the COMSEC variables required for secure operations with VINSON and the ICOM radio. The EN will be issued one per radio location for SINCGARS and IHFR radios. Multiple radio configurations or locations (such as CPs) will have one EN.

b. The BECS, as a self-contained system, is primarily used to generate, transfer, and store CNR variables and SOI materials. It is also used to fill the various loading and transfer devices associated with CNR systems. The system generates five time periods of SOI data per computer run. The operator turns out as many time periods as required by requesting consecutive runs from the computer and storing the data on computer disks or printing out the files. The operator specifies the starting number of the time periods to generate the equivalent of a 30-day SOI using the consecutive runs. The BECS terminal locally generates variables for FH operation.

(1) Hopsets. Hopsets are generated from the list of allocated frequencies the BECS operator enters. Frequencies are classified by any restrictions on their use for areas or power levels available. The restrictions on frequencies are compared against any restrictions on network usage. For example, a brigade command network requires use of high-power at all times. The command network is coded to restrict assignment of frequencies coded as low power only to the hopset. The frequency manager programs any restrictions for frequency use as it is entered into the data base. Frequencies can be entered into the BECS by using either discrete frequencies or lockout sets.

(a) With discrete frequencies, the frequency allocation list is fed into the computer one frequency at a time and is compiled in a frequency map.

(b) With lockout sets (applies to SINCGARS only), undesired blocks of frequencies or discrete frequencies are prohibited from use. There are two types of lockout sets--net definition and common lockout sets. Up to six net definition lockouts that correspond to the six preset channels can be programmed into the radio. Net definition lockouts specify groups of frequencies that are prohibited from use for the hopping sequence on a particular preset. Common lockout sets (total of eight available) specify frequencies that are simultaneously prohibited from use for all presets.

(c) Until either the BECS or the SCC is modified to manage SINCGARS and MSRT/RAU frequencies, the MSRT/RAU frequencies have to be entered as lockouts for the radio.

(2) Net identifiers. The corps/division BECS operator manually inputs net identifiers in the master net list. The networks are numbered consecutively starting at the point the computer operator specifies. Net identifiers will be allocated per echelon as follows: 000 to 099 for theater and above, 100 to 299 for corps, and 300 to 999 for division.

(3) Cue and manual frequencies. The computer assigns cue and manual frequencies for each network in the data base for each time period. It automatically assigns 50 kHz channels for cue frequencies and 25 kHz channels for manual frequencies.

(4) TSK variables. The corps TSK is generated at the corps spectrum management office and is transferred down with the corps SOI information to the division. The terminals at division and below are used as distribution systems for the TSK and the remaining SOI information.

(5) Single-channel frequencies. Single-channel network frequencies can be planned using the network and frequency restriction capability of BECS. It uses a modified type of Boolean logic to match requirements to restrictions. The operator sets up his own restrictions list to match whatever the unit missions require. Single-channel retransmission frequencies are automatically assigned frequencies a minimum of 10 MHz apart.

(6) Data networks. Data networks are not planned for automatically. If separate hopsets are required to provide interference-free networks for data, they must be listed as a separate network in the data base. Additionally, they must be coded with restrictions to provide the sole user frequencies necessary for clear transmissions.

(7) Call signs, suffixes, additional identifiers. The BECS produces randomly assigned call signs, suffixes, and additional identifiers for five time periods. The call signs developed are in accordance with JANAP 119 and ACP 100 standards.

(8) Challenge and password. The BECS generates a challenge and password (or sign and countersign) for each time period in the SOI.

(9) Pyrotechnics and smoke. The data base must specify the pyrotechnic and smoke signal meanings desired for unit operations. The BECS assigns a different pyrotechnic or smoke signal for the designated meanings in the SOI on a random rotating basis.

8-3. Software Management

a. The SOI data base is produced at the division and corps level to ensure all units within the organization are included. Although the SOI document is produced at the highest level, it is developed from the lowest unit up and is only as good as the input provided by the subordinate units. Subordinate units provide their network and subscriber input to the higher headquarters based on their particular missions and organization.

(1) Begin building the BECS data base with the unit's current SOI. It is the most likely complete source or nearly complete source of information for current operations. The current SOI can be updated quickly to reflect mission requirements and unit organization.

(2) If there is no current unit SOI, the BSO should coordinate with the G3/S3 for guidance on organization, network structure, and membership. The BSO should also poll the commanders, the communications chief, and other battalion or brigade officers to obtain general guidance and to identify any special requirements.

(3) The SOI information has to be supplemented with any changes due to task organizing. Previous SOI packages had to use spare call signs and frequencies if units were attached for specific missions. The BSO can now add the attached unit to the data base and include it in the main SOI as a subscriber. The BSO should review unit contingency operation plans for information regarding wartime requirements and SOI data.

(4) After compiling and organizing the information for networks, subscribers, and signal devices, the BSO forwards the data to the next higher signal planning section. The process is repeated up to the division signal office where all the divisional requirements are compiled, and the BECS data base is programmed into the computer. Corps units follow the same process up to the corps signal office, where the corps SOI data base is developed.

(5) The corps and division data bases are developed separately and remain separate. The two echelons exchange SOI information after the SOI is developed at their respective levels. The newly acquired data base is then processed via the data base merge function provided by BECS. Merging can only be accomplished one time with any one data base.

b. Modern communication systems provide easy methods for transferring digital information or codes from one device to another. The SOI data and FH variables are no exception. The data can be transferred from BECS terminal to BECS terminal; BECS to EN; or EN to EN. Additionally, the information can pass over wire, radio, or by computer disk. The method used depends on time constraints and available equipment.

(1) If time is not a factor, the information can be stored on a computer disk and hand-carried to the required units. With a computer disk, there is a permanent record and data accuracy is guaranteed. However, there are disadvantages:

- A separate disk must be used for each subordinate.
- Time is required to courier the disk.
- Computers must use the same disk size and operating system.

(2) The second method of passing information from one BECS terminal to another is over a direct data link computer to computer. This can be over any number of different mediums, such as radio or wire links. The connection can be secured by any of the current inventory digital data encryption devices (for example, KG-84, KY-57/58, or KY-68). Figure 8-1 shows the connections through KY-68s and the switched ACU network. Figure 8-2 shows the switched land-line network extended using the NRI system as part of the data link. A BGU interface (BGUI) unit is required in both cases to convert the computer signal to one compatible with-the transmission equipment. Advantages of data transmissions are as follows:

- Many subordinates can be filled at the same time.
- Information can be transferred quickly (in only minutes).

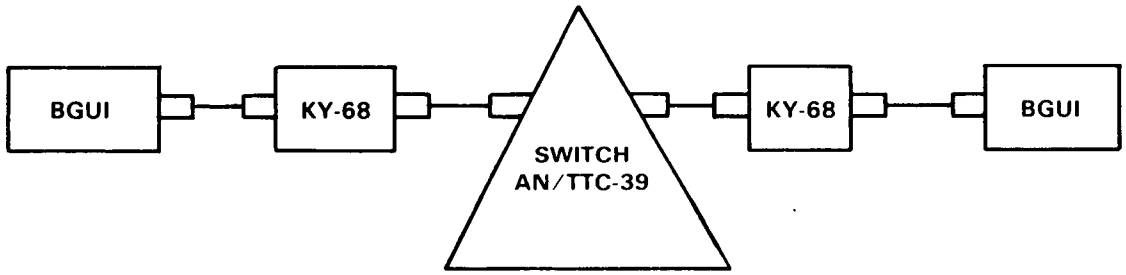

Figure 8-1. BGUI/KY-68 remote distribution.

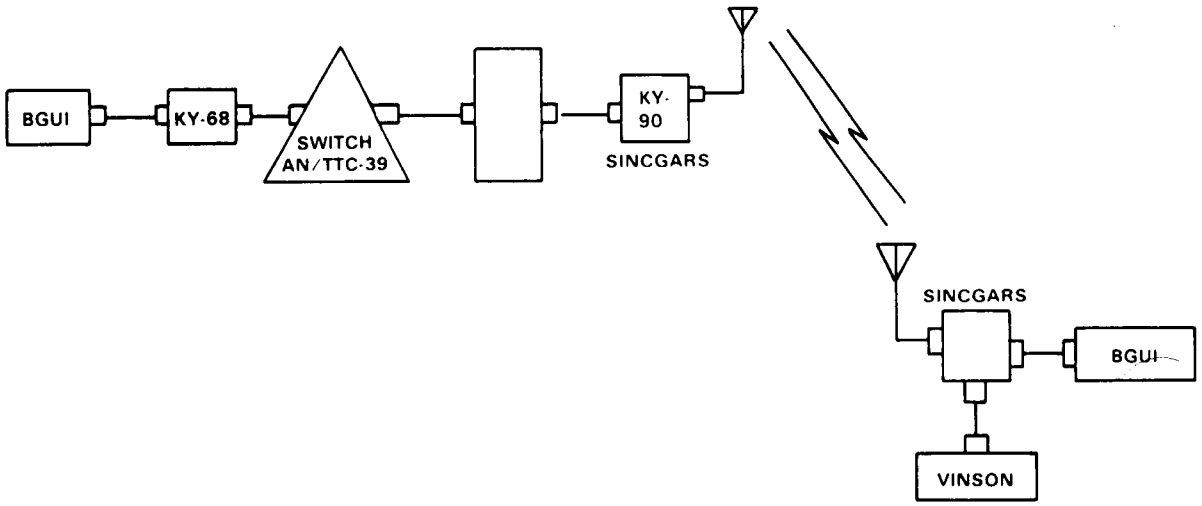

Figure 8-2. BGUI/KY-90 remote distribution.

(3) After the SOI data has been distributed to the various headquarters, the EN is used to disseminate the information to the system users. The EN is the common fill device for all Army systems, including SINCGARS, EPLRS, and JTIDS. The EN can be filled from a BECS terminal or from another EN. The fill can be done locally or remotely over-the-air (either CNR or ACU) .

(a) If done locally from the BGU, up to six ENs can be filled at the same time (Figure 8-3). EN to EN allows filling only one device at a time.

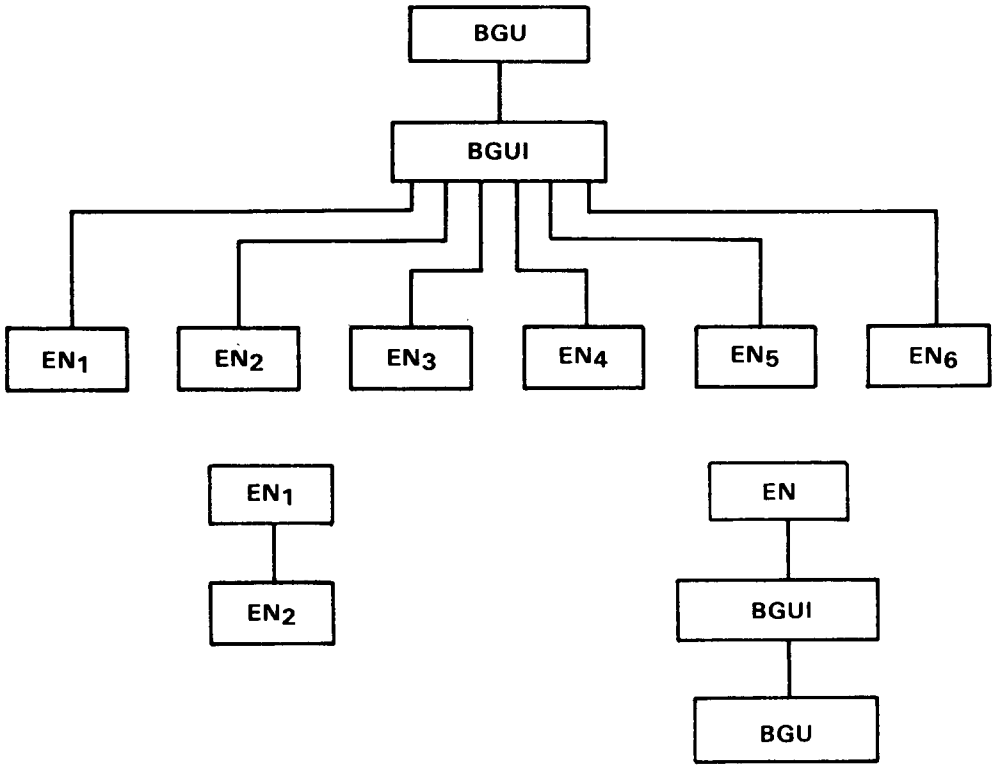

Figure 8-3. Local SOI distribution.

(b) Over-the-air fills require the transmitting station to identify the recipient by user number before transmission. The transmitting terminal can earmark from 1 to 16 ENs to receive the new SOI information (Figure 8-4) .

(4) The SOI data should never be transmitted over nonsecure circuits. The link may be either bulk encrypted by the system devices (KG-27) or end-to-end encrypted by data encryption devices (VINSON KG-84, KY-68) before transmission.

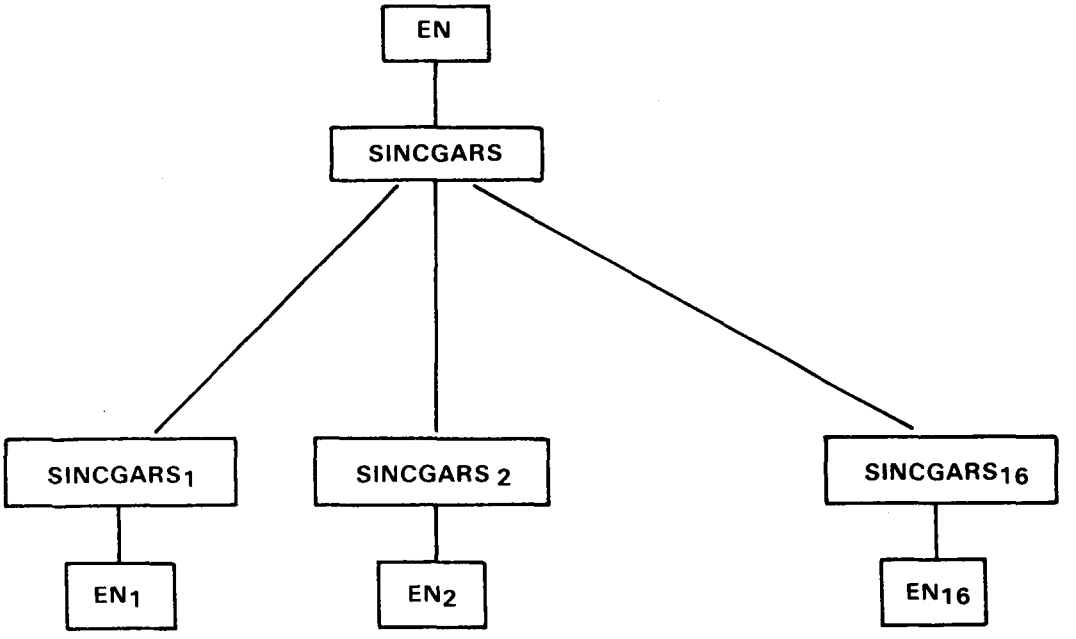

Figure 8-4. Remote SOI distribution.